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ABSTRACT

The purpose of this study was to examine the simultaneous relationships among intelligence, personality, and vocational interests. The study sample was composed of 874 individuals aged 14 to 83. Intelligence, personality, and vocational interest were measured using the Kaufman Adolescent and Adult Intelligence Test, Myers-Briggs Type Indicators, and Strong Interest Inventory respectively. A canonical correlation analysis was performed between each pair of instruments. Overall, the results of the study indicate modest relationships among the domains of intelligence, personality, and vocational interests. The relationships observed in the present canonical correlation analyses between intelligence and both personality and vocational interests reflect overlap with general ability, especially the kind that is associated with schooling and overall acculturation experiences. The relationships do not seem to denote an overlap with fluid ability, the kind of intelligence that is demonstrated when people are able to solve novel problems that are largely unaffected by schooling; nor do the relationships seem to donate correspondence to intellectual abilities that are less saturated with "g" (general intelligence), such as short-term memory or visual-spatial ability. Whereas the areas of overlap should help professionals interpret the measures jointly, the results affirm that none of the measures are redundant with each other and all have much uniqueness to contribute to an assessment of an adolescent or adult. (Contains 27 references.) (JE)

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THE RELATIONSHIP AMONG INTELLIGENCE, PERSONALITY, AND VOCATIONAL INTERESTS

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The Relationship Among Intelligence, Personality, and Vocational Interests

Numerous research studies have examined the relationship between intelligence and personality (e.g., Harren & Biscardi, 1980; Hengstler, Reichard, Uhl, & Goldman, 1981, May; Kaufman & McLean, 1993; Schurr, Ruble, Henriksen, & Alcorn, 1989), intelligence and vocational interests (e.g., Lindemann & Matarazzo, 1990; Lowman, 1991; McLean & Kaufman, 1992), and personality and vocational interests (e.g., Apostal, 1991; Apostal & Marks, 1990; Dillon & Weissman, 1987). However, these studies were done on individual pairs of these constructs using separate samples and, in many cases, small samples. Little information could be found in the literature where the relationship among these three constructs was examined with the same sample of subjects. The purpose of this study was to examine the simultaneous relationships among intelligence, personality, and vocational interests.

Counselors and other helping professionals often use instruments that measure intelligence, personality, and vocational interests (Harrison, Kaufman, Hickman, & Kaufman, 1988; Holland, 1985a; Lindemann & Matarazzo, 1990; Lowman, 1991; Myers & McCaulley, 1985) when advising clients. While their focus is usually on a single individual, the research base of the instruments they are using is primarily from only one of these instruments and, at most, two simultaneously. Thus, much of their theory base is concluded from separate samples, and theorized relationships among the three constructs may or may not exist. This puts professional clinicians at a decided disadvantage when trying to advise clients on career choices and other life decisions. For example, what role does ability and personality play for a particular profession in which a client shows a particular interest?

Method

Subjects

The sample was composed of 874 individuals aged 14 to 83 years (mean Age = 34.78 years, SD = 12.49). The group included 521 females (59.61%) and 353 males (40.39%), and was composed of 730 whites (83.52%), 86 blacks (9.84%), 48 Hispanics (5.49%), and 10 "others" (Native Americans, Asian-Americans) (1.14%). Subjects were tested as part of the nationwide standardization of the Kaufman Adolescent and Adult Intelligence Test (KAIT) (Kaufman & Kaufman, 1993). The various age, sex, educational attainment, and socioeconomic factors roughly parallel those of the United States population at large.

Instruments

The three constructs under study (intelligence, personality, and vocational interest) were measured using the Kaufman Adolescent and Adult Intelligence Test (KAIT), Myers-Briggs Type Indicators (MBTI), and Strong Interest Inventory (SII), respectively. The salient features of each are described.

Kaufman Adolescent and Adult Intelligence Test (KAIT). The KAIT (Kaufman & Kaufman, 1993) is a new intelligence test for ages 11 to 85+ years that provides Fluid, Crystallized, and Composite IQs, each with a mean of 100 and standard deviation of 15, and follows the theoretical model of Horn and Cattell (1966, 1967; Horn, 1989). Tasks were developed from the models of Piaget's (1972) formal operations and Luria's (1973) planning ability in an attempt to include high-level, decision-making, adult-oriented tasks. Visual-motor coordination and visual-motor speed are deemphasized, although speed of problem solving is required for several tasks. A Core Battery of six subtests (three Crystallized, three Fluid) yields the three IQs; an Expanded Battery of 10 subtests also includes alternate Crystallized and Fluid subtests, and two tasks that measure the delayed recall of information learned previously in the examination. For the present study, only the IQs were used as variables.

The KAIT was normed on 2,000 individuals aged 11 to 85+ years, and was stratified on the variables of age, gender, race or ethnic group, geographic region, and socioeconomic status (parental education for ages 11-24 years, self-education for ages 25 and above). Mean split-half reliability coefficients were .95 for Crystallized IQ, .95 for Fluid IQ, and .97 for Composite IQ. Mean test-retest reliability coefficients, based on 153 normal individuals aged 11-85+ retested after a one-month interval, were as follows: Crystallized IQ (.94), Fluid IQ (.87), and Composite IQ (.94). Exploratory and confirmatory factor analysis supported the construct validity of the Crystallized and Fluid Scales and the placement of subtests on each scale. Correlational analyses with the WISC-R at ages 11-16 (N = 118) and WAIS-R at ages 16-83 (N = 343) indicated that KAIT Composite IQ correlated in the mid-.80s with Wechsler's Full Scale IQ; KAIT Crystallized and Fluid IQs correlated in the .70s and .80s with Wechsler's Full Scale IQ for these predominantly normal samples.

Myers-Briggs Type Indicator (MBTI). The Myers-Briggs (Briggs & Myers, 1983; Myers & McCaulley, 1985) contains the following four separate indices (abbreviations for each preference are shown in parentheses):

1. Extraversion (E)-Introversion (I), designed to reflect whether a person is an extravert or introvert in Jung's sense of these terms: extraverts relate more easily to the outer world of people and things whereas introverts relate more easily to the inner world of concepts and ideas.

2. Sensing (S)-Intuition (N), designed to reflect a person's preference between two opposite ways of perceiving: sensing (reports observable facts or happenings through one or more of the five senses) versus intuition (reports possibilities and relationships).

3. Thinking (T)-Feeling (F), designed to reflect a person's preference between two opposite ways of judging: thinking (bases judgments on impersonal analysis and logic) versus feeling (bases judgments on personal values).

4. Judging (J)-Perceiving(P), designed to reflect a person's preference for dealing with the outer or extraverted world either by judging or by perceiving; the one who prefers judging deals with the outer world by thinking or feeling, whereas the one who prefers perceiving deals with the outer world by sensing or intuition.

Individuals respond to 126 items that deal with inconsequential everyday events. Sets of items were developed for each of the four indices; for each item, examinees must make a forced choice between the poles of a particular index. Responses are weighted 2-1-0, where 2 points are given for responses that are very highly predictive of an index, 1 point is given for responses that are highly predictive of an index, and 0 points are given for overpopular responses. For the Thinking-Feeling index, a somewhat different weighting system is used to score the test protocols of males and females. The person is classified at one end or the other of each index based on whichever weighted total score is higher. The four preferences denote the person's "type," and are abbreviated as ENFP, ISTP, INFJ, and so forth. The letters denote the direction of the preference; to denote the strength of the person's preference on each index, the manual provides a table for converting differences between the weighted scores to "preference scores" and "continuous scores" (Myers & McCaulley, 1985, Table 2.2).

The Myers-Briggs manual provides split-half and test-retest reliability coefficients for the four indices. For Form G, based on a total sample of 32,671 males and females between the ages of 9 and 60+ years, the following split-half coefficients were obtained using continuous scores: Extraversion-Introversion (.82), Sensing-Intuition (.84), Thinking-Feeling (.83), and Judging-Perceiving (.86) (Myers & McCaulley, 1985, Table 10.2). Median test-retest coefficients for Form G (interval = 5 to 7 weeks), based on a 1979 study with four groups of psychology students (total N = 116) at Mississippi State University who were tested under standard conditions, are as follows: Extraversion-Introversion (.82), Sensing-Intuition (.86), Thinking-Feeling (.72), and Judging-Perceiving (.84) (Myers & McCaulley, 1985, Table 10.5). The Myers-Briggs manual also provides a wealth of validity data with criteria such as

personality inventories, interest scales, intelligence tests, achievement tests, scholastic aptitude tests, and school performance (Myers & McCaulley, 1985, Chapters 8 and 11). Factor analysis of data obtained on 359 college students supported the construct validity of the four Myers-Briggs indices, and additional analyses supported the appropriateness of the procedure for weighting items (Thompson & Borello, 1986).

Strong Interest Inventory (SII). The Strong Interest Inventory (Hansen & Campbell, 1985), Form T325 of the Strong Vocational Interest Blank, was administered for this study. The Strong, with a sixth-grade reading level and intended primarily for high school students and adults, comprises 325 items that require the examinee to respond "Like," "Indifferent," or "Dislike." These responses indicate interests in a variety of occupations, occupational activities, hobbies, leisure activities, school subjects, and types of people. Responses are computer analyzed to derive scores for 264 scales that are presented in an organized format on a profile sheet offering interpretive information (Hansen & Campbell, 1985).

The scales include six General Occupational Themes from Holland's (1973, 1985a) theory; 23 Basic Interest Scales that indicate consistency of interests or aversions in specific areas such as agriculture, writing, science, sales, and religious activities; 207 Occupational Scales that measure the degree of similarity between the person's interests and the characteristic interests of men and women in diverse occupations; two Special Scales, measuring introversion-extraversion and degree of comfort in academic settings; and 26 Administrative Indexes which help to identify invalid or unusual profiles.

For this study, the scales of interest were the Holland General Occupational Themes and the Basic Interest Scales. People who earn their highest scores on each Holland theme are best described as follows (abbreviations for each theme are shown in parentheses):

Realistic (R)--People with good physical skills who like to work outdoors and with tools; they sometimes have trouble expressing themselves or in communicating their feelings, and they prefer working with things rather than with ideas or people.

Investigative (I)--Task-oriented people who are interested in science, in solving abstract problems, and in understanding the physical world; they prefer to think through problems rather than act them out, are often creative, and do not like structured situations with many rules.

Artistic (A)--Artistically oriented people who thrive on self-expression, especially in the artistic media; they are not interested in highly structured problems or in those requiring gross physical strength.

Social (S)--People who are sociable, responsible, and humanistic; they express themselves well and get along well with others, seek attention, and prefer to solve problems by discussions with others.

Enterprising (E)--People who are adept with words, enjoy persuading others to their viewpoint, and prefer social tasks where they can assume leadership; they are impatient with precise work or work involving sustained intellectual effort.

Conventional (C)--People who prefer the highly ordered verbal and numerical activities associated with office work; they don't seek leadership, and prefer to know exactly what is expected of them.

The above definitions refer to "pure" types of each General Occupational Theme, although in reality people are blends of several themes; interpretation of a person's Strong profile involves examining his or her scores on each of the six themes and determining which ones are most dominant.

The 23 Basic Interest Scales are each associated with one of Holland's six themes; for example, Public Speaking is associated with the Enterprising theme, Adventure with the Realistic theme, and Mathematics with Investigative. Standard scores having a mean of 50 and standard deviation of 10 are provided for each theme and interest scale. Scores range from about 30 to 70; scores above 50 indicate a higher interest level in a given area than that of the average adult.

The Strong's norms are based on the 1985 General Reference Sample of 600 people, 300 men and 300 women (mean age = 38.2 years). This sample included men and women selected from professional, vocational/technical, and nonprofessional occupations corresponding to all six of Holland's

themes. Education level of the sample ranged from those without a high school diploma to those with doctoral degrees.

The Strong manual (Hansen & Campbell, 1985, pp. 30-31 and 38-39) provides internal consistency and stability data for the Holland General Occupational Themes and the Basic Interest Scales. Alpha reliability coefficients for the six Holland scales averaged .92 for 1,445 males (range = .90 to .95) and .91 for 1,410 females (range = .90 to .93). Test-retest coefficients over a two-week interval for 106 women and 74 men ranged from .85 to .93 with a median of .91; coefficients over a one-month interval for 35 women and 65 men ranged from .84 to .91 with a median of .86. Coefficients for the 23 interest scales, based on the same samples, were as follows: median alphas of .90 for males (range = .77 to .96) and .90 for females (range = .77 to .95); a median two-week stability coefficient of .91 (range = .82 to .93) and a median one-month stability coefficient of .88 (range = .79 to .93). The manual also presents evidence of the Strong's concurrent and predictive validity, frequently studying "hit rates" to see if the Strong profile matches the person's actual choice of occupation. Hansen's (1986) summary of five predictive validity studies using the Strong instruments with predominantly white samples indicated moderate to excellent hit rates ranging from 36% to 72% accuracy.

Procedure and Analyses

A canonical correlation analysis was performed between each pair of instruments. Canonical correlation analysis is recommended to examine the relationship between two sets of variables (Cliff & Krus, 1976; Darlington, Weinberg, & Walberg, 1973; Thompson, 1984). Canonical correlation analysis has been used to examine the relationship among three or more sets of variables (e.g., Jain, 1972). Canonical correlation has also been used to examine the relationship between sets of IQ variables (McLean, Kaufman, & Reynolds, 1988; Reynolds, Stanton, McLean, & Kaufman, 1989). In cases where the Strong was involved, two separate canonical analyses were performed--one with the Holland (1973, 1985a) General Occupational Themes and again with the 23 Basic Interest Scales. For each analysis, all

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canonical correlations were computed and for the first canonical coefficient in each case, three types of coefficients were computed: standardized canonical function coefficients, index coefficients, and structure coefficients. These coefficients provide different but related types of information about the nature of the relationships between the sets of variables. The standardized canonical function coefficients are analogous to factor pattern coefficients in a factor analytic study or the beta coefficients in a regression analysis. The index coefficients are the correlation coefficients between a given variable and the scores on the canonical composite (latent variable) in the variable set to which the variable does not belong. The structure coefficients are the correlation coefficients between a given variable and the scores on the canonical composite (latent variable) in the variable set to which the variable belongs.

Results

KAIT and MBTI

The correlations between the pairs of subtests are presented in Table 1. Two canonical correlations were found to be statistically significant with p-values of 0.0001 and 0.0216, respectively. However, only the first one was also found to be practically meaningful. The first two canonical correlations accounted for 69.13% and 15.10% of the common variance, respectively. The function, index, and structure coefficients for the first canonical correlation are presented in Table 2. For the standardized canonical function coefficients, the KAIT Definitions Scale and MBTI Sensing/Intuition Score were major contributors to the relationship.

Table 1

Bivariate Correlations Between the KAIT and MBTI

KAIT	MBTI			
	Extraversion/ Introversion	Sensing/ Intuitive	Thinking/ Feeling	Judging/ Perceiving
Auditory Comprehension	01	25	-03	06
Auditory Delayed Recall	05	13	02	03
Definitions	07	25	02	03
Double Meaning	07	22	-02	07
Famous Faces	05	10	07	-01
Logical Steps	05	18	-02	02
Mystery Codes	01	20	-03	02
Memory for Block Designs	03	17	-12	05
Rebus Learning	02	19	-01	02
Rebus Delayed Recall	00	06	01	05
Mental Status	-04	04	-05	-04

Note. Decimals have been omitted.

Table 2

Canonical Coefficients for the KAIT and MBTI

Test	Scale	Coefficients			Squared Structure Coefficient (%)
		Function	Index	Structure	
KAIT	Auditory Comprehension	.22	.26	.78	60.9
	Auditory Delayed Recall	.24	.14	.43	18.2
	Definitions	.44	.28	.85	71.8
	Double Meanings	.07	.23	.70	49.6
	Famous Faces	.26	.13	.40	15.7
	Logical Steps	-.02	.21	.63	40.2
	Mystery Codes	.25	.22	.66	43.1
	Memory for Block Designs	.11	.19	.57	32.8
	Rebus Learning	.03	.21	.62	39.0
	Rebus Delayed Recall	-.18	.05	.15	2.2
	Mental Status	-.00	.06	.18	3.2
	Adequacy (mean squared structure)				34.3
	Redundancy (Adequacy times squared R_c)				3.8
Squared Canonical Correlation (squared R_c)					11.1
MBTI	Redundancy (Adequacy times squared R_c				2.3
	Adequacy (mean squared structure)				21.1
	Extraversion/Introversion	.22	.06	.19	3.7
	Sensing/Intuitive	1.13	.29	.88	76.8
	Thinking/Feeling	-.13	-.05	-.15	2.3
	Judging/Perceiving	-.43	.04	.12	1.5

The structure coefficients ranged from .15 to .85 for the KAIT and from -.15 to .88 for the MBTI scores. Index coefficients ranged from .05 to .28 for the KAIT and from -.05 to .29 for the MBTI

scores. The first canonical correlation of .33 between the KAIT and MBTI scores indicate that the two sets of scores approximately share 11% of the variance. An adequacy index represents the proportion of variance of the original unweighted variables represented by the canonical variate scores for each scale. In this example, the adequacy coefficients are 34.3% and 21.1% for the KAIT and MBTI scales, respectively. The redundancy coefficients, on the other hand, represent the proportion of variance in one set of variables that is reproducible by the other. In this example, 3.8% of the KAIT variability is reproducible by the MBTI variables, and 1.5% of the MBTI variability is reproducible by the KAIT variables.

KAIT and SII General Occupational Themes

The correlations between the pairs of subtests are presented in Table 3. Three canonical correlations were found to be statistically significant with p-values of 0.0001, 0.0001, and 0.0178, respectively. However, only the first one is reported in this article. The first three canonical correlations accounted for 50.88%, 30.74% and 11.11% of the common variance respectively. The function, index, and structure coefficients for the first canonical correlation are presented in Table 4. For the standardized canonical function coefficients, the KAIT Definitions Scaled Score and the Holland Investigative General Occupational Theme on the Strong were major contributors to the relationship.

The structure coefficients ranged from .14 to .88 for the KAIT and from -.10 to .76 for the Strong scores. Index coefficients ranged from .06 to .35 for the KAIT and from -.04 to 0.30 for the Strong scores. The first canonical correlation of .39 between the KAIT and the Strong scores indicate that the two sets of scores approximately shared 15.41% of their variance. In this example, the adequacy coefficients are 33.7% and 18.0% for the KAIT and the SII scales, respectively. Also, in this example 5.2% of the KAIT variability is reproducible by the SII scale variables, and 2.8% of the SII scale variability is reproducible by the KAIT variables.

Table 3

Bivariate Correlations Between the KAIT and SII General Occupational Themes

KAIT	SII					
	Realistic	Investigative	Artistic	Social	Enterprising	Conventional
Auditory Comprehension	07	27	26	08	02	-02
Auditory Delayed Recall	02	09	09	-02	-02	-04
Definitions	-03	21	26	03	-03	-03
Double Meaning	-03	18	23	03	-04	-07
Famous Faces	-02	10	11	02	03	-01
Logical Steps	02	20	14	-03	-07	-01
Mystery Codes	06	18	10	00	-02	02
Memory for Block Designs	19	26	07	-05	02	04
Rebus Learning	00	17	19	08	-04	00
Rebus Delayed Recall	-04	00	03	-05	-04	-03
Mental Status	03	10	03	02	-02	03

Note. Decimals have been omitted.

Table 4

Canonical Coefficients for the KAIT and SII General Occupational Themes

Scale		Function	Index	Structure	Squared Structure Coefficient
KAIT	Auditory Comprehension	.34	.33	.84	70.6
	Auditory Delayed Recall	.10	.14	.35	12.3
	Definitions	.43	.35	.88	77.4
	Double Meanings	.22	.31	.79	62.4
	Famous Faces	.19	.14	.35	12.3
	Logical Steps	.12	.26	.66	43.6
	Mystery Codes	-.02	.19	.49	24.0
	Memory for Block Designs	-.01	.19	.48	23.0
	Rebus Learning	.01	.24	.62	38.4
	Rebus Delayed Recall	-.11	.06	.14	2.0
	Mental Status	.00	.08	.20	4.0
	Adequacy (mean square structure)				33.7
	Redundancy (Adequacy times squared R_c)				5.2
Squared canonical correlation (squared R_c)					15.4
Strong	Redundancy (Adequacy times squared R_c)				2.8
	Adequacy (mean squared structure)				18.0
	Realistic	-.45	.01	.03	.1
	Investigative	.88	.27	.69	47.6
	Artistic	.55	.30	.76	57.8
	Social	-.23	.05	.13	1.7
	Enterprising	-.16	-.02	-.05	0.0
	Conventional	-.12	-.04	-.10	1.0

MBTI and SII Basic Interest Scales

The correlations between the pairs of subtests are presented in Table 5. All four canonical correlations were found to be statistically significant with p-values all equal to 0.0001. However, only the first one is analyzed in this paper. The first four canonical correlations account for 49.26%, 28.90%, 13.24%, and 8.60% of the common variance, respectively. The standardized, index, and structure coefficients for the first canonical correlation are presented in Table 6. For the standardized canonical function coefficient, the MBTI Sensing/Intuitive scale and the Strong Investigative were major contributors to the MBTI and SII, respectively.

The structure coefficients ranged from -.09 to .98 for the MBTI scores and from -.32 to .73 for the SII scores. Index coefficients ranged from -.05 to .55 for the MBTI scores and from -.18 to .41 for the SII scores. The first canonical correlation of .56 between the MBTI and SII scores indicate that the two sets of scores share 31.31% of their variance. In this example, the adequacy coefficients are 30.0% and 19.3% for the MBTI and SII, respectively. Also in this example, 9.47% of the MBTI variability is reproducible by the SII scale variances, and 6.0% of the SII variability is reproducible by the MBTI variables.

Table 5

Bivariate Correlations Between the MBTI and the SII Basic Interest Scales

MBTI	SII					
	Realistic	Investigative	Artistic	Social	Enterprising	Conventional
Extraversion/ Introversion	02	-01	-02	-25	-23	00
Sensing/ Intuitive	11	35	43	08	03	-20
Thinking/ Feeling	-25	-19	16	22	-06	-08
Judging/ Perceiving	09	06	18	04	00	-24

Note. Decimals have been omitted.

Table 6

Canonical Coefficients for the MBTI and SII Basic Interest Scales

Scale		Function	Index	Structure	Squared Structure Coefficient
MBTI	Extraversion/ Introversion	.12	.03	.05	0.3
	Sensing/ Intuitive	1.02	.55	.98	96.0
	Thinking/ Feeling	-.12	-.05	-.09	0.8
	Judging/ Perceiving	-.03	.27	.48	23.0
	Adequacy (mean square structure)				30.0
	Redundancy (Adequacy times squared R_c)				9.4
Squared canonical correlation (squared R_c)					31.3
	Redundancy (Adequacy times squared R_c)				6.0
	Adequacy (mean square structure)				19.3
Strong	Realistic	-.08	.14	.25	
	Investigative	.72	.38	.67	
	Artistic	.52	.41	.73	
	Social	-.24	.03	.05	
	Enterprising	.07	.01	.01	
	Conventional	-.52	-.18	-.32	

KAIT and SII Basic Interest Scales

The covariate correlations are presented in Table 7. Four canonical correlations were found to be statistically significant with each p-value being 0.0001. However, only the first one was also found to be practically meaningful. The first two canonical correlations accounted for 43.71% and 18.23% of the common variance respectively. The function, index, and structure coefficients for the first canonical

correlation are presented in Table 8. For the standardized canonical function coefficients Definitions and Writing were major contributors to the KAIT and SII subscale scores, respectively.

The structure coefficients ranged from .14 to .88 for the KAIT and from -.28 to .60 for the MBTI scores. Index coefficients ranged from .07 to .46 for the KAIT and from -.15 to .31 for the MBTI scores. The first canonical correlation of .53 between the KAIT and MBTI scores indicate that the two sets of scores share 27.68% of their variance. In this example, the adequacy coefficients are 35.1% and 7.0% for the KAIT and the SII subscales, respectively. Also, in this example 9.7% of the KAIT variability is reproducible by the SII subscale variates, and 2.0% of the SII subscale variability is reproducible by the KAIT variables.

Table 7

Bivariate Correlations Between the SII Basic Interest Scales and the KAIT

SII Basic Interest Scales	KAIT Subscales										
	Auditory Comprehension	Auditory Delayed Recall	Definitions	Double Meanings	Famous Faces	Logical Steps	Mystery Codes	Memory for Block Designs	Rebus Learning	Rebus Delayed Recall	Mental Status
Realistic											
Agriculture	02	05	-03	-04	-03	-03	-01	07	-04	03	05
Nature	19	11	15	15	03	12	10	14	14	01	10
Adventure	13	06	07	08	03	10	10	17	01	-03	06
Military Activities	-04	-08	-09	-07	-01	-10	-06	03	-04	08	05
Mechanical Activities	04	01	-04	-04	01	03	07	19	00	-04	03
Investigative											
Science	17	05	10	11	07	13	12	19	09	-02	07
Mathematics	16	03	14	10	03	24	20	26	15	01	07
Medical Science	19	04	11	10	05	06	06	13	07	-03	02
Medical Service	-04	-06	-10	-05	-04	-09	-07	-08	-05	-07	02
Artistic											
Music/ Dramatics	19	05	19	14	08	07	06	00	14	-01	02

SII Basic Interest Scales	KAIT Subscales										
	Auditory Comprehension	Auditory Delayed Recall	Definitions	Double Meanings	Famous Faces	Logical Steps	Mystery Codes	Memory for Block Designs	Rebus Learning	Rebus Delayed Recall	Mental Status
Art	17	06	15	17	08	10	06	05	15	02	01
Writing	29	11	33	27	13	14	12	08	21	05	01
Social											
Teaching	18	03	14	13	08	12	12	06	18	-03	02
Social Service	00	-05	-03	01	00	-10	-07	-14	01	-05	02
Athletics	00	01	-04	-08	02	-03	-02	01	-06	-04	02
Domestic Arts	-02	00	-05	00	-04	-05	-03	-09	00	-03	-01
Religious Activities	-02	-06	-04	-02	-05	-08	-06	-10	07	-03	-01
Enterprising											
Public Speaking	15	00	09	05	07	00	05	05	07	-02	02
Law/Politics	16	02	10	07	12	00	07	07	04	01	02
Merchandising	03	00	01	-03	04	-05	00	00	01	-02	01
Sales	-07	-07	-10	-14	00	-13	-08	-02	-10	-03	-08
Business Management	04	01	01	-04	06	-04	00	03	00	-02	03
Conventional											
Office Practice	-16	-07	-09	-12	-05	-08	-08	-13	-06	-04	01

Note. Decimals have been omitted.

Table 8

Canonical Correlations for the KAIT and the SII Basic Interest Scales

	Function	Index	Structure	Squared Structure Coefficient
Auditory Comprehension	.32	.44	.83	68.9
Auditory Delayed Recall	.15	.20	.38	14.4
Definitions	.45	.46	.88	77.4
Double Meanings	.05	.38	.72	51.8
Famous Faces	.14	.16	.30	9.0
Logical Steps	.18	.38	.73	53.3
Mystery Codes	.07	.31	.59	34.8
Memory for Block Designs	.14	.32	.60	36.0
Rebus Learning	-.04	.33	.62	38.4
Rebus Delayed Recall	-.14	.07	.14	2.0
Mental Status	-.04	.08	.15	2.3
Adequacy (mean square structure)				35.1
Redundancy (Adequacy times squared R_c)				9.7
Squared canonical correlation (squared R_c)				27.7
Redundancy (Adequacy times squared R_c)				2.0
Adequacy (mean square structure)				7.0
Realistic				
Agriculture	-.32	-.01	-.01	0.0
Nature	.49	.19	.37	13.7
Adventure	.24	.14	.27	7.3
Military Activities	-.21	-.08	-.16	2.6
Mechanical Activities	-.13	.04	.07	.00

	Function	Index	Structure	Squared Structure Coefficient
Investigative				
Science	-.26	.18	.34	11.6
Mathematics	.42	.21	.40	16.0
Medical Science	.27	.16	.31	9.6
Medical Service	-.28	-.10	-.19	3.6
Artistic				
Music/ Dramatics	.07	.18	.35	12.3
Art	-.14	.17	.33	10.9
Writing	.53	.31	.60	36.0
Social				
Teaching	.23	.17	.34	11.6
Social Service	-.35	-.05	-.10	1.0
Athletics	.01	-.01	-.03	0.1
Domestic Arts	-.07	-.05	-.10	1.0
Religious Activities	.05	-.01	-.13	1.7
Enterprising				
Public Speaking	-.03	.11	.21	4.4
Law/Politics	-.03	.13	.25	6.3
Merchandising	-.05	.01	-.03	0.1
Sales	-.16	-.11	-.20	4.0
Business Management	.23	.03	.05	0.0
Conventional				
Office Practice	-.20	-.15	-.28	7.9

MBTI and SII Basic Interest Scales

The covariate correlations are presented in Table 9. All four canonical correlations were found to be statistically significant with each p-value being 0.0001. However, only the first one was also found

to be practically meaningful. The first two canonical correlations accounted for 50.62% and 25.05% of the common variance, respectively.

The function, index, and structure coefficients are presented in Table 10. For the standardized canonical function coefficients, Sensing/Intuitive and Adventure were the major contributors to the MBTI and SII subscale scores, respectively.

The structure coefficients ranged from -.32 to .92 for the MBTI and from -.57 to .63 for the SII subscale scores. The index coefficients ranged from -.20 to 0.59 for the MBTI and from -.36 to .41 for the SII subscale scores. In this example, the adequacy coefficients are 31.4% and 10.2% for the MBTI and the SII subscales, respectively. Also, in this example, 12.9% of the MBTI variability is reproducible by the SII subscale variables, and 4.1% of the SII variability is reproducible by the MBTI variables.

The first canonical correlation of .64 between the MBTI and the SII indicate that the two sets of scores share 41.0% of their variance.

Table 9

Bivariate Correlations Between the SII Subscales and the MBTI

SII	MBTI			
	Extraversion/ Introversion	Sensing/Intuitive	Thinking/Feeling	Judging/ Perceiving
Realistic				
Agriculture	03	03	-08	05
Nature	06	18	05	03
Adventure	-17	32	-23	30
Military Activities	-05	-05	17	01
Mechanical Activities	03	11	-28	08
Investigative				
Science	05	27	-24	06
Mathematics	08	09	-23	-04
Medical Science	-08	19	-11	04
Medical Service	-08	-02	09	-04
Artistic				
Music/Dramatics	-10	35	20	13
Art	01	34	19	14
Writing	01	38	11	12
Social				
Teaching	-12	14	20	05
Social Service	-23	10	27	02
Athletics	-22	-02	-11	-03
Domestic Arts	-07	-10	25	15
Religious Activities	-10	-07	29	-09
Enterprising				
Public Speaking	-29	20	-05	05

SII	MBTI			
	Extraversion/ Introversion	Sensing/Intuitive	Thinking/Feeling	Judging/ Perceiving
Law/Politics	-20	21	-15	07
Merchandising	-18	02	03	05
Sales	-19	-06	-09	00
Business Management	-17	-04	-08	-11
Conventional				
Office Practice	01	-31	16	-23

Note. Decimals have been omitted.

Table 10

Canonical Correlation for the MBTI and the SII Subscales

	Function	Index	Structure	Squared Structure Coefficient
Extraversion/ Introversion	.00	-.03	-.05	0.0
Sensing/Intuitive	.87	0.59	.92	84.6
Thinking/Feeling	-.39	-.20	-.32	10.2
Judging/Perceiving	.14	0.35	.55	30.3
Adequacy (mean square structure)				31.4
Redundancy (Adequacy times R_c)				12.9
Squared canonical correlation (squared R_c)				41.0
Redundancy (Adequacy times R_c)				4.1
Adequacy (mean square structure)				10.2
Realistic				
Agriculture	-.03	.07	.11	1.2
Nature	.02	.14	.22	4.8
Adventure	.42	.41	.63	39.7
Military Activities	-.19	.02	.04	.02
Mechanical Activities	.00	.21	.33	10.9
Investigative				
Science	.29	.34	.52	27.0
Mathematics	.12	.16	.25	6.3
Medical Science	-.13	.21	.33	10.9
Medical Service	-.02	-.06	-.09	0.8
Artistic				
Music/Dramatics	.15	.24	.38	14.4
Art	.12	.24	.37	13.7
Writing	.24	.31	.48	23.0

	Function	Index	Structure	Squared Structure Coefficient
Social				
Teaching	-.03	.04	.06	0.4
Social Service	.13	-.01	-.02	0.0
Athletics	-.16	.03	.04	0.2
Domestic Arts	-.15	-.21	-.32	10.2
Religious Activities	-.25	-.19	-.29	8.4
Enterprising				
Public Speaking	.08	.21	.32	10.2
Law/Politics	.07	.25	.39	15.2
Merchandising	-.06	0.00	0.00	0
Sales	.15	-0.01	-.02	0
Business Management	-.11	-0.02	-.03	0.1
Conventional				
Office Practice	.37	-.36	-.57	32.5

Discussion

In this study, Definitions proved to be the only KAIT subtest that had a substantial relationship to the MBTI or SII in the first canonical correlation of the respective analyses. This subtest is a vocabulary test, from the standpoint of the Wechsler-Binet tradition of intellectual assessment, and an excellent measure of crystallized intelligence from the theory of Horn (1989) and Horn and Cattell (1966, 1967). Vocabulary tests traditionally have proven to be the best measures of "g" or general intelligence, and KAIT Definitions follows in this tradition by yielding a "g" loading of .82 for the total sample of 2,000 individuals ages 11 to 94 in the KAIT standardization sample (Kaufman & Kaufman, 1993, Table 8.7). That value is the highest among the KAIT subtests. Tests of crystallized intelligence reflect problem solving when correct solutions depend to a large extent on formal schooling and acculturation.

Again, Definitions is an excellent measure of crystallized ability, loading .80 on that factor in an oblimin rotated factor analysis for the total standardization sample (Kaufman & Kaufman, 1993, Table 8.8).

Therefore, the relationships observed in the present canonical correlation analyses between intelligence and both personality and vocational interests reflect overlap with general intellectual ability, especially the kind of general ability that is associated with schooling and overall acculturation experiences. The relationships do not seem to denote an overlap with fluid ability, the kind of intelligence that is demonstrated when people are able to solve novel problems that are largely unaffected by schooling; nor do the relationships seem to denote correspondence to intellectual abilities that are less saturated with "g," such as short-term memory or visual-spatial ability.

In fact, the associations noted with the MBTI Sensing-Intuition dimension and the SII Investigative Scale are quite sensible. The Intuitive pole of the MBTI Scale has been associated with making effective management decisions (Agor, 1985), with left-brain dominance (Shiflett, 1989), and with self-directed learning (Johnson, Sample, & Jones, 1988). The Investigative Theme from Holland's SII interpretive system denotes individuals with interests in science; people who score high on the Investigative theme demonstrate a higher conceptual level (Harren & Biscardi, 1980), and have higher educational attainment, undergraduate grades, and socioeconomic status (Smart, 1989). Further, occupations associated with the Investigative Theme require, on the average, the highest educational level of any Holland interest type (Gottfredson, 1980).

It is, therefore, logical that the aspect of intelligence that relates most closely to the MBTI Intuitive dimension and the SII Investigative Theme is the aspect associated most closely with general intelligence, crystallized ability, schooling, and acculturation. Moreover, it is also extremely sensible that the Intuitive dimension and the Investigative Theme were the main scales in their respective batteries to relate meaningfully to the KAIT in the analyses with intelligence, and to relate meaningfully to each other in the analysis of the Strong and the MBTI.

The overlap of about 11% of the variance between the MBTI and KAIT is entirely consistent with previous research that has related personality to intelligence, such as Hofer's (1994) correlational analysis involving second-order factors of the 16PF (including extraversion) and measures of crystallized and fluid ability for samples of felons and police applicants. The MBTI and SII General Occupational Themes shared more variance with each other (31%) than either measure did with the KAIT (11-15%). That result is consistent with the fact that Holland's six-category system for classifying vocational interests may be thought of as a theory of personality. The various General Occupational Themes are actually defined as personality types.

Overall, the results of this study indicate modest relationships among the domains of intelligence, personality, and vocational interests. Whereas the areas of overlap should help professionals interpret the various measures jointly, the results affirm that none of the measures are redundant with each other, and all have much uniqueness to contribute to an assessment of an adolescent or adult.

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